

WHAT IS CLAIMED IS:

1 1. A computer-implemented method for detecting alarm conditions, the method
2 comprising:

3 receiving a first trigger event notification for a monitored occurrence on a network;
4 asserting a first alarm condition to represent the first trigger event notification;
5 receiving a next trigger notification after the first trigger event notification, the next
6 trigger event notification also for the monitored occurrence;

7 determining whether the next trigger event notification occurred within a
8 predetermined amount of time after the first trigger event notification;

9 if the next trigger event notification occurred within a predetermined time after the
10 first trigger event notification, maintaining the first alarm condition; and

11 if the next trigger event notification occurred more than said predetermined amount of
12 time after the first trigger event notification, asserting a second alarm condition to represent
13 the next trigger event notification.

1 2. The method of claim 1 further comprising:

2 establishing a redundancy window which specifies the predetermined amount of time;

3 if said next trigger event notification occurs more than said predetermined amount of
4 time after the first trigger event notification, detecting that the redundancy window has
5 elapsed without an occurrence of a subsequent trigger event notification; and

6 upon detecting that the redundancy window has elapsed without the occurrence of a
7 subsequent trigger event notification, clearing the first alarm condition.

1 3. The method of claim 2, wherein maintaining the first alarm condition further
2 comprises restarting the redundancy window based on when said next trigger event
3 notification was received.

1 4. The method of claim 1, wherein the first trigger event notification and said next
2 trigger event notification are traps.

1 5. A computer-implemented method for detecting alarm conditions, the method
2 comprising:

3 periodically sampling the rate at which similar trigger event notifications arrive,
 4 wherein the trigger event notifications are for monitored occurrences on a network;
 5 comparing the sampled rate to a first threshold;
 6 periodically computing N, wherein N is the number of sampled rates within a
 7 preceding window of time that exceed said first threshold;
 8 each time N is computed, performing the operations of:
 9 (a) comparing N to a second threshold;
 10 (b) if N is greater than said second threshold and if a preexisting alarm
 11 condition does not exist, asserting a first alarm condition; and
 12 (c) if N is greater than said second threshold and if the preexisting alarm
 13 condition does exist, maintaining the preexisting alarm condition for a predetermined
 14 future period of time.

1 6. The computer-implemented method of claim 5 wherein the operations further
 2 include (d) if N is not greater than the second threshold and if a preexisting alarm condition
 3 does exist and if the predetermined amount of time has elapsed since the immediately
 4 preceding last time that N exceeded the second threshold, clearing the preexisting alarm
 5 condition.

1 7. The method of claim 5, wherein the trigger event notifications are traps.

1 8. The method of claim 5, wherein the first threshold is zero.

1 9. The method of claim 5, wherein the first threshold is greater than zero.

1 10. The method of claim 5, wherein the second threshold varies as a function of time.

1 11. The method of claim 10, further comprising computing the second threshold
 2 based on past performance of a parameter that is represented by the trigger event notification.

1 12. A computer-implemented method for detecting alarm conditions, the method
 2 comprising:

3 periodically sampling the rate R_i at which similar trigger event notifications arrive,
 4 wherein the trigger event notifications are for monitored occurrences on a network, and

5 wherein R_i is the sampled rate at time i ;
 6 comparing the sampled rate R_i to a first threshold;
 7 for each sampled rate R_i that exceeds the first threshold, computing an amount M_i by
 8 which the sampled rate R_i exceeds said first threshold;
 9 periodically computing T_i which is a sum of M_i for all sample times i within a
 10 preceding window of time;
 11 for each T_i that is computed, performing the operations of:
 12 (a) comparing T_i to a second threshold;
 13 (b) if T_i is greater than said second threshold and if a preexisting alarm
 14 condition does not exist, asserting a first alarm condition; and
 15 (c) if T_i is greater than said second threshold and if the preexisting alarm
 16 condition does exist, maintaining the preexisting alarm condition for a predetermined
 17 future period of time.

1 13. The computer-implemented method of claim 12 wherein the operations further
 2 include (d) if T_i is not greater than the second threshold and if a preexisting alarm condition
 3 does exist and if the predetermined amount of time has elapsed since the immediately
 4 preceding last time that T_i exceeded the second threshold, clearing the preexisting alarm
 5 condition.

1 14. The method of claim 13, wherein the trigger event notifications are traps.

1 15. The method of claim 13, wherein the first threshold is zero.

1 16. The method of claim 13, wherein the first threshold is greater than zero.

1 17. The method of claim 13, wherein the second threshold varies as a function of
 2 time.

1 18. The method of claim 17, further comprising computing the second threshold
 2 based on past performance of a parameter that is represented by the trigger event notification.

1 19. A machine-based method for displaying alarm data, the method comprising:
 2 receiving alarm data in a data table having columns, data rows, and a subset of the

3 columns designated as key columns, the columns each corresponding to an alarm data field,
4 the data rows each corresponding to a different alarm, and the subset being such that for any
5 given data row in the data table and for a tuple constructed from values of the given data row
6 corresponding to each of the columns of the subset, the tuple uniquely identifies the given
7 data row relative to correspondingly constructed tuples for all other data rows in the data
8 table;

9 receiving a set of uncollapsed columns that is a subset of the key columns;
10 grouping the data rows into display rows according to the set of uncollapsed columns,
11 such that a first data row is in a same display row as a second data row if the first data row
12 and the second data row have matching values in each column in the set of uncollapsed
13 columns; and
14 rendering the data table as a display table populated with the columns of the data
15 table and with the display rows instead of the data rows.

1 20. The method of claim 19, wherein rendering includes rendering placeholder
2 symbols for cells in columns that are not in the set of key columns.

1 21. The method of claim 19, wherein rendering includes, if a column corresponds to
2 a severity field of the alarm data, displaying in the cell of each row a value indicating the
3 maximum severity among the alarm data corresponding to the row.

1 22. The method of claim 19, further comprising receiving user input that designates
2 the key columns.